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CLAIMS:

1.   Method for determining lens shift (LS) in an optical system (30) of an optical
disc drive apparatus (1), the optical system (30) comprising:
beam generator means (31) for directing a light beam (32) towards an optical disc (2);
an optical detector (35) for receiving a reflected light beam (32d) and for generating an
5   detector output signal (S_R);
the method comprising the steps of:
determining a relationship between lens shift (LS) and at least one signal component (Px; Py)
derivable from the detector output signal (S_R);
processing the actual detector output signal (S_R) to calculate said at least one signal
10   component (Px; Py);
calculating actual lens shift (LS) from said at least one signal component (Px; Py) on the
basis of said relationship.

2.   Method according to claim 1, wherein the optical detector (35) is designed to
15   generate detector output signals (A, B, C, D) representing the detected amount of light in four
quadrants (35a, 35b, 35c, 35d), and wherein said at least one signal component (Px) is
defined according to

$$Px = LP\left(\frac{(A+B)-(C+D)}{A+B+C+D}\right) \qquad (2)$$

wherein LP() indicates a low-pass filtering.

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3.   Method according to claim 1, wherein the optical detector (35) is designed to
generate detector output signals (A, B, C, D) representing the detected amount of light in four
quadrants (35a, 35b, 35c, 35d), and wherein said at least one signal component (Py) is
defined according to

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$$Py = LP\left(\frac{(B+C)-(A+D)}{A+B+C+D}\right) \qquad (3)$$

wherein LP() indicates a low-pass filtering.

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4.   Method according to claim 1, wherein information regarding said relationship is read from a memory (150).

5.   Method for determining focal offset error (FOE) in an optical system (30) of an optical disc drive apparatus (1), the optical system (30) comprising:

beam generator means (31) for directing a light beam (32) towards an optical disc (2);

an optical detector (35) for receiving a reflected light beam (32d) and for generating an detector output signal (S_R);

an objective lens (34) arranged for focussing the light beam (32b) in a focal spot (F) on an information layer of the disc (2), the objective lens (34) being displaceable in a direction perpendicular to the optical axis of the light beam (32);

the method comprising the steps of:

detecting a signal representative for the actual lens shift (LS);

calculating the actual focal offset error (FOE) from said lens shift (LS) representing signal on the basis of a predetermined relationship between focal offset error (FOE) and lens shift (LS).

6.   Method according to claim 5, wherein said lens shift (LS) representing signal is derived from the detector output signal (S_R).

7.   Method according to claim 5, wherein information regarding said relationship is read from a memory (150).

8.   Method according to claim 5, wherein lens shift (LS) is determined in accordance with the method of claim 1.

9.   Method for determining focal offset error (FOE) in an optical system (30) of an optical disc drive apparatus (1), the optical system (30) comprising:

beam generator means (31) for directing a light beam (32) towards an optical disc (2);

an optical detector (35) for receiving a reflected light beam (32d) and for generating an detector output signal (S_R);

an objective lens (34) arranged for focussing the light beam (32b) in a focal spot (F) on an information layer of the disc (2), the objective lens (34) being displaceable in a direction perpendicular to the optical axis of the light beam (32);

the method comprising the steps of:

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determining a direct relationship between focal offset error (FOE) and at least one signal
component (Px; Py) derivable from the detector output signal (S_R);
processing the actual detector output signal (S_R) to calculate said at least one signal
component (Px; Py);

5   calculating actual lens shift (LS) from said at least one signal component (Px; Py) on the
basis of said direct relationship.

10.   Method according to claim 9, wherein the optical detector (35) is designed to
generate detector output signals (A, B, C, D) representing the detected amount of light in four

10   quadrants (35a, 35b, 35c, 35d), and wherein said at least one signal component (Px) is
defined according to

$$Px = LP\left(\frac{(A+B)-(C+D)}{A+B+C+D}\right) \qquad (2)$$

wherein LP() indicates a low-pass filtering.

15   11.   Method according to claim 9, wherein the optical detector (35) is designed to
generate detector output signals (A, B, C, D) representing the detected amount of light in four
quadrants (35a, 35b, 35c, 35d), and wherein said at least one signal component (Py) is
defined according to

$$Py = LP\left(\frac{(B+C)-(A+D)}{A+B+C+D}\right) \qquad (3)$$

20   wherein LP() indicates a low-pass filtering.

12.   Method for controlling an axial position of an objective lens (34) in an optical
system (30) of an optical disc drive apparatus (1), the optical system (30) further comprising:
beam generator means (31) for directing a light beam (32) towards an optical disc (2);

25   an optical detector (35) for receiving a reflected light beam (32d) and for generating an
detector output signal (S_R);
the objective lens (34) being arranged for focussing the light beam (32b) in a focal spot (F)
on an information layer of the disc (2), the objective lens (34) being displaceable in a
direction perpendicular to the optical axis of the light bema (32);

30   the method comprising the steps of:
generating a reference signal (S_REF) representing a desired amount of focal error;
generating a focal error signal (S_FE) representing the actual focal error;

generating a focal offset error signal (S_{FO}) representing the actual focal offset error (FOE);

adding the focal offset error signal (S_{FO}) to said reference signal (S_{REF}), and subtracting said focal error signal (S_{FE}), to obtain a result signal (S_{RES});

generating an focal actuator control signal (S_{CF}) on the basis of said result signal ($S_{RES} = S_{REF}$

5       $+ S_{FO} - S_{FE}$).

13.   Method according to claim 12, wherein said focal offset error signal (S_{FO}) is determined in accordance with claim 5.

10   14.   Method according to claim 12, wherein said focal offset error signal (S_{FO}) is determined in accordance with claim 9.

15.   Optical disc drive apparatus (1) for reading information from an optical disc (2) or writing information to an optical disc (2), comprising:

15   beam generator means (31) for directing a light beam (32) towards the optical disc (2);

an optical detector (35) for receiving a reflected light beam (32d) and for generating an detector output signal (S_R);

an objective lens (34) being arranged for focussing the light beam (32b) in a focal spot (F) on an information layer of the disc (2), the objective lens (34) being displaceable in a direction

20   perpendicular to the optical axis of the light beam (32), the objective lens (34) further being displaceable in a direction parallel to the optical axis of the light beam (32);

a focal actuator (52) for setting the axial position of the objective lens (34);

a control circuit (90) for generating a control signal (S_{CF}) for controlling the focal actuator (52);

25   wherein the control circuit (90) is designed to perform the method of claim 12.

16.   Optical disc drive apparatus (1) according to claim 15, wherein the control circuit (90) comprises:

an input (91) for receiving the detector output signal (S_R);

30   a first processing block (130) for processing the detector output signal (S_R) to calculate a focal error signal (S_{FE});

a second processing block (140) for calculating a focal offset signal (S_{FO});

means (110) for adding the focal offset signal (S_{FO}) to and subtracting the focal error signal

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(S_{FE}) from a reference signal (S_{REF}) and generating a result signal (S_{RES});

means for generating an actuator control signal (S_{CF}) on the basis of said result signal (S_{RES}).

17.   Optical disc drive apparatus (1) according to claim 16, wherein the control circuit (90) further comprises a memory (150) containing information on a relationship between the focal offset signal (S_{FO}) and at least one measuring signal (Px;Py) derivable from the detector output signal (S_R).

18.   Optical disc drive apparatus (1) according to claim 16, wherein the second processing block (140) is designed for processing the detector output signal (S_R) to derive said at least one measuring signal (Px;Py) from the detector output signal (S_R), and to calculate the focal offset signal (S_{FO}) from said at least one measuring signal (Px;Py) on the basis of the information stored in said memory (150).

19.   Optical disc drive apparatus (1) according to claim 16, wherein the control circuit (90) further comprises a memory (150) containing information on a relationship between the focal offset signal (S_{FO}) and lens shift (LS);
wherein the control circuit (90) receives an input signal (S_R) containing information representing the actual lens shift (LS);
wherein the second processing block (140) is designed for processing said signal (S_R) to calculate the actual lens shift (LS), and to calculate the focal offset signal (S_{FO}) from said actual lens shift (LS) on the basis of the information stored in said memory (150).

20.   Optical disc drive apparatus (1) according to claim 19, wherein the memory (150) further contains information on a relationship between the lens shift (LS) and at least one measuring signal (Px;Py) derivable from the detector output signal (S_R);
wherein the second processing block (140) is designed to derive said at least one measuring signal (Px;Py) from the detector output signal (S_R), and to calculate the actual lens shift (LS) from said at least one measuring signal (Px;Py) on the basis of the information stored in said memory (150).